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# Analysis of avifaunal diversity, richness, status and food guild in Ecopark, West Bengal, India

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## ABSTRACT

This is the first report of annotated checklist of birds in Ecopark. During December 2019 to November 2021 a total of 171 different bird species from 19 orders and 57 families was recorded from this urban park. The order Passeriformes (50.29%) and the family Ardeidae (7.01%) were found to be the most dominating. Among all birds, 167 Least Concern and 4 globally Near Threatened species were recorded. In addition, 106 species were resident, 47 were winter migrant, 10 local migrant, 4 passage migrant, 3 summer migrant and only one species of Lesser Frigate bird was observed as vagrant in respect to Rajarhat Wetland. Eight types of feeding guilds were observed of which Insectivore birds (36.25%) were found to be most abundant followed by Carnivores (28.65%) and Omnivores (22.80%). In the second year, 15 new bird species was observed. Bird diversity was found to be much higher during the covid lockdown.

**Keywords:** Avifauna, Biodiversity, Food guild, Migratory status, Urban Park

## 1. INTRODUCTION

The world's bird population is estimated to be over 10,000 species. They have important ecological role in the environment, helps in seed dispersal, pollination, pest control (Tabur, 2015; Jha, 2021; Raval, 2022). The Indian subcontinent is home to about 13% (1313) of the world's bird species (Grimmett et al. 2016). However with increasing urbanization, there is a rapid change in landscape and land usage, putting severe pressure on bird populations (Tzortzakaki et al., 2018). Urbanization has been highlighted as one of the key factors of species endangerment in the Anthropocene, which is unsurprising (MacGregor-Fors et al. 2020). The majority of land is changed from natural open space to crowded urban areas, species abundance is reduced as only those species that can survive and adapt to human activity grow to dominate the community (Marzluff, 2017). The preservation and improvement of biodiversity rely heavily on urban areas (Farinha-Marques et al., 2011). Urban parks, in particular, provide a wealth of potential avian habitat. It provides an opportunity to research the effects of human-induced habitat changes on bird communities, such as extensive vegetation

modification, reduction in the size of suitable habitats, disturbance associated with proximity to human populations, the presence of buildings etc (Farinha-Marques et al., 2011). Birds are easily observed by trained observers and give a way to investigate the effects of different urban designs on birds (Chace & Walsh, 2006).

As a result, we concentrated our research on urban bird diversity within Ecopark, a megadiverse area, with a particular emphasis on the relative importance of urban green spaces (primarily urban forests, grasslands and gardens) and waterbodies (Lake and ponds). Ecopark is present at the centre of the Rajarhat wetland which is rich in biodiversity. This wetland provides a variety of ecosystem services. However, the wetland is continuously shrinking due to rapid urbanisation. Ecopark is the last stronghold of protected grasslands. The knowledge on the bird community present within the park is crucial for developing species specific conservation plans.

The bird diversity in urban areas has been studied throughout West Bengal in regions like Purulia town (Mahato et al., 2021), Durgapur, Berhampur (Mistry, 2015), Cooch Behar (Das and Mitra, 2013), sub-urban area of Southern West Bengal (Mukhopadhyay and Mazumdar, 2017), and residential localities of Kolkata. These studies focus on the bird diversities in urbanised areas with differing vegetation structures. However, there is a lack of knowledge on the avian composition and habitat utilization within urban biodiversity parks. Our study focuses on one of the largest urban parks in North 24 Parganas district and the avian diversity of this park.

## 2. MATERIALS AND METHODS

### Study Area

The research has been carried out in Ecopark, North 24 Parganas (Figure 1) ( $22^{\circ}36'11.1240''\text{N}$   $88^{\circ}27'59.6736''\text{E}$ ) for two years from December 2019 to November 2021. The Ecopark is a typical urban park, covers an area of 194 hectares that consists of different type of habitats like grassland, forest land, marsh land and wetland. It also includes a large lake or waterbody of 42 hectares with islands in it.

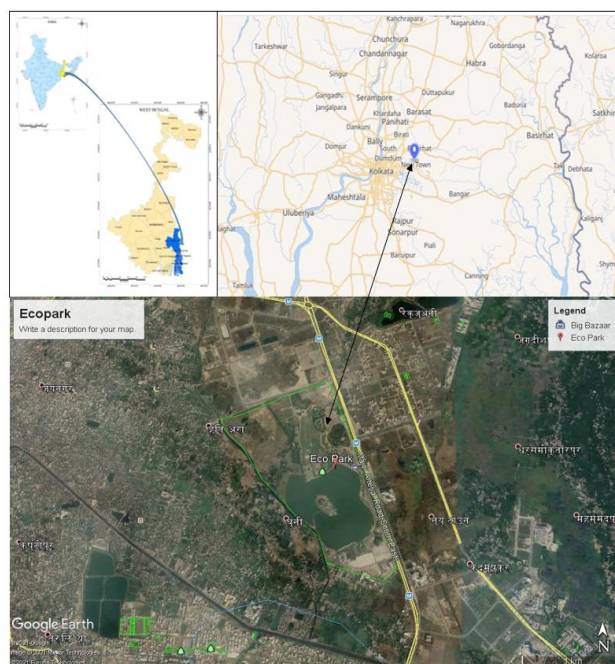


Figure 1: Map of the study area

**Pakhibitan:** Inside the Ecopark, Pakhibitan is a small patch of natural habitat with least amount of human interference. This makes it an ideal habitat for birds as well as other animal species. It is spread over three acres, consisting of distinct habitats such as wet grassland, forest land and two small waterbodies. In the grassland *Typha latifolia* is the main dominant species which plays an important role in much of the bird's ecology such as during nesting, hiding from predators and in other social interactions.

**Butterfly Garden:** The vegetation in this garden consist of shrubs, bushes and some big trees. This habitat is maintained for the conservation of butterflies. It not only attracts the butterflies but also attracts insectivorous, frugivorous and nectarivorous birds.

**Rainforest:** The vegetation of the rainforest consists mainly of a variety of large tree species, planted in homogeneous clusters. This area mainly attracts forest dwelling and frugivorous birds.

### Sampling Method

Collection of the data has been obtained using three type of sampling methods. Except Pakhibitan, the whole Ecopark data was taken two days per week by direct observation using line transect method (Bibby et al., 2000). The length of the Line transect was one km. Point count has been used to collect data from Pakhibitan. Data was obtained two times (10.00am – 1.00 pm and 3.00 pm - 6.00 pm) on a regular basis. Temperature, humidity, wind direction and wind speed were recorded along with the data. Opportunistic observation was made both Ecopark and Pakhibitan. For identification of birds and preparing of checklist we used the book “Birds of Indian Subcontinent” (Grimmett et al., 2011) and eBird. All birds are enlisted along with their current conservation status, food habit and migratory status. Birds are also grouped according to their body size, where birds that were up to 20cm has been considered as ‘small’ and larger than 20cm and smaller than 60cm was grouped as ‘medium’ sized birds. Birds that are bigger than 60cm was normally grouped as ‘large’. During summer the average temperature was 33.66°C and during winter average temperature was 24.72°C. Bird photographs were taken using digital cameras (Nikon Coolpix P900 and Nikon Coolpix P600). Long distance birds or small birds were being confirmed by Binocular (Olympus 8\* 40 DPS1).

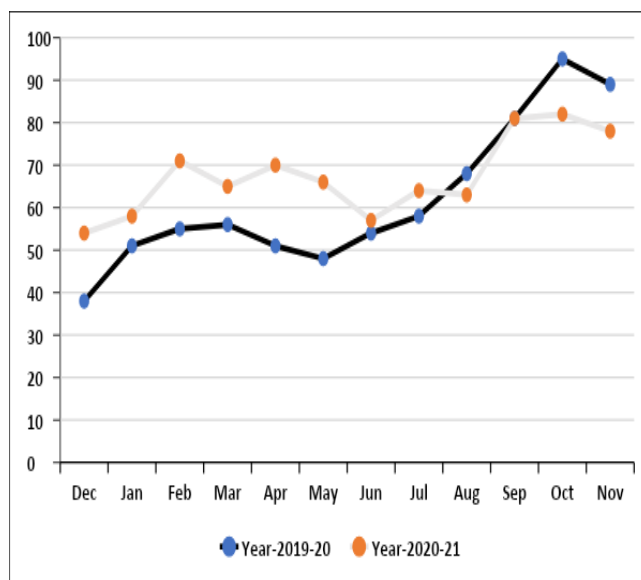
## 3. RESULTS AND DISCUSSION

In this research, we observed 171 species (Table 1) of birds belonging to 19 orders and 57 families within the Ecopark. The order Passeriformes 86 (50.29%) was discovered to be the most dominant followed by Pelecaniformes 12 (7.01%), Charadriiformes and Cuculiformes each was 9(5.26%) (Table 1). Family Ardeidae 12 (7.01%) has the highest number of species followed by Cuculidae and Motacillidae each was 9 (5.26%) (Table 1). Ardeidae consists of herons and egrets which find a greater representation in Ecopark because there are many ponds and lakes scattered all over the park. This provides suitable foraging and roosting sites for species such as Black-crowned Night Heron, Indian Pond Heron, Striated Heron, Cattle Egret etc.

The migratory status (Table 1) of the recorded birds shows that 106 (62%) species were resident, 47 (27.48%) were winter migrant, 10(5.84%) local migrant, 4(2.33%) passage migrant, 3 (1.75%) summer migrant and only one pelagic species (Lesser Frigatebird) was vagrant with respect to Rajarhat Wetland. The Lesser Frigatebird is likely a wind-blown species that lost its way during the cyclonic storms that hit coastal West Bengal in the month of April, 2020.

We identified eight types of feeding guilds (Table 1) among the species. They are Insectivores 62 (36.25%), Carnivores 49 (28.65%), Omnivores 39 (22.80%), Granivore 9 (5.26%), Herbivore 6 (3.50%), Invertivore 3 (1.75%), Frugivore 2 (1.16%), Nectarivore 1 (0.58%). The analysis of feeding guild reveals that the bird community of this region is not homogenised in terms of either taxonomy or functionality. The greater number of insectivores indicates a healthy population of lower taxa.

Birds are classified according to their size (Table 1). Among the 171 species 85(50%) species were medium sized birds, 71(41%) species were small and 15(9%) species were large sized birds.



**Figure 2:** Month wise variation of birds in two years.

The diversity of birds was compared between two years (Figure 2) on the basis of months. In the year of 2019-20 we have found out 139 species of birds and in 2020-21 we found out 154 species of birds. The highest number of birds (95 species) was found in the month of October 2019-20 in two years. The number of species is increasing because the alternative habitats are decreasing rapidly. The park was closed for public according to COVID protocols for most of the second year of our study. This have contributed to increasing species richness in the second year due to less anthropogenic disturbances.

**Table 1:** Checklist of birds found in the Ecopark with their IUCN status, Residential status, feeding guild, and Size.

| SL. No.                         | Common Name               | Scientific Name                  | IUCN Status | Residential status | Feeding Guild | Size | Y-1 | Y-2 |
|---------------------------------|---------------------------|----------------------------------|-------------|--------------------|---------------|------|-----|-----|
| <b>Order-Anseriformes</b>       |                           |                                  |             |                    |               |      |     |     |
| <b>Family-Anatidae</b>          |                           |                                  |             |                    |               |      |     |     |
| 1                               | Lesser Whistling-duck     | <i>Dendrocygna javanica</i>      | LC          | LM                 | H             | M    | 1   | 1   |
| 2                               | Knob billed Duck          | <i>Sarkidiornis melanotos</i>    | LC          | WM                 | H             | L    | 0   | 1   |
| 3                               | Cotton Pygmy-goose        | <i>Nettapus coromandelianus</i>  | LC          | LM                 | O             | M    | 0   | 1   |
| 4                               | Gadwall                   | <i>Mareca strepera</i>           | LC          | WM                 | O             | M    | 0   | 1   |
| <b>Order- Podiciformes</b>      |                           |                                  |             |                    |               |      |     |     |
| <b>Family-Podicipedidae</b>     |                           |                                  |             |                    |               |      |     |     |
| 5                               | Little Grebe              | <i>Tachybaptus ruficollis</i>    | LC          | R                  | O             | M    | 1   | 0   |
| <b>Order-Ciconiiformes</b>      |                           |                                  |             |                    |               |      |     |     |
| <b>Family-Ciconiidae</b>        |                           |                                  |             |                    |               |      |     |     |
| 6                               | Woolly-necked stork       | <i>Ciconia episcopus</i>         | LC          | LM                 | C             | L    | 0   | 1   |
| 7                               | Painted Stork             | <i>Mycteria leucocephala</i>     | NT          | R                  | C             | L    | 1   | 1   |
| 8                               | Asian Openbill            | <i>Anastomus oscitans</i>        | NT          | R                  | C             | L    | 1   | 1   |
| <b>Order- Pelecaniformes</b>    |                           |                                  |             |                    |               |      |     |     |
| <b>Family- Ardeidae</b>         |                           |                                  |             |                    |               |      |     |     |
| 9                               | Yellow Bittern            | <i>Ixobrychus sinensis</i>       | LC          | R                  | C             | M    | 1   | 1   |
| 10                              | Cinnamon Bittern          | <i>Ixobrychus cinnamomeus</i>    | LC          | R                  | C             | M    | 1   | 1   |
| 11                              | Black Bittern             | <i>Ixobrychus flavicollis</i>    | LC          | R                  | C             | M    | 1   | 1   |
| 12                              | Striated Heron            | <i>Butorides striata</i>         | LC          | R                  | C             | M    | 0   | 1   |
| 13                              | Black-crowned Night Heron | <i>Nycticorax nycticorax</i>     | LC          | R                  | C             | M    | 1   | 1   |
| 14                              | Indian Pond Heron         | <i>Ardeola grayii</i>            | LC          | R                  | C             | M    | 1   | 1   |
| 15                              | Grey Heron                | <i>Ardea cinerea</i>             | LC          | R                  | C             | L    | 1   | 1   |
| 16                              | Purple Heron              | <i>Ardea purpurea</i>            | LC          | R                  | C             | L    | 1   | 1   |
| 17                              | Cattle Egret              | <i>Bubulcus ibis</i>             | LC          | R                  | C             | M    | 1   | 1   |
| 18                              | Great Egret               | <i>Ardea alba</i>                | LC          | R                  | C             | L    | 1   | 1   |
| 19                              | Intermediate Egret        | <i>Ardea intermedia</i>          | LC          | R                  | C             | L    | 1   | 1   |
| 20                              | Little Egret              | <i>Egretta garzetta</i>          | LC          | R                  | C             | M    | 1   | 1   |
| <b>Order-Suliformes</b>         |                           |                                  |             |                    |               |      |     |     |
| <b>Family- Fregatidae</b>       |                           |                                  |             |                    |               |      |     |     |
| 21                              | Lesser Frigatebird        | <i>Fregata ariel</i>             | LC          | V                  | C             | L    | 1   | 0   |
| <b>Family-Phalacrocoracidae</b> |                           |                                  |             |                    |               |      |     |     |
| 22                              | Little Cormorant          | <i>Microcarbo niger</i>          | LC          | R                  | C             | M    | 1   | 1   |
| 23                              | Indian Cormorant          | <i>Phalacrocorax fuscicollis</i> | LC          | R                  | C             | M    | 1   | 1   |
| 24                              | Great Cormorant           | <i>Phalacrocorax carbo</i>       | LC          | WM                 | C             | L    | 0   | 1   |

| Order- Flconiformes    |                            |                                 |    |    |    |   |   |   |
|------------------------|----------------------------|---------------------------------|----|----|----|---|---|---|
| Family-Falconidae      |                            |                                 |    |    |    |   |   |   |
| 25                     | Common Kestrel             | <i>Falco tinnunculus</i>        | LC | WM | C  | M | 1 | 1 |
| 26                     | Amur Falcon                | <i>Falco amurensis</i>          | LC | WM | C  | M | 1 | 0 |
| Order- Accipitriformes |                            |                                 |    |    |    |   |   |   |
| Family-Accipitridae    |                            |                                 |    |    |    |   |   |   |
| 27                     | Black-winged kite          | <i>Elanus caeruleus</i>         | LC | R  | C  | M | 0 | 1 |
| 28                     | Black Kite                 | <i>Milvus migrans</i>           | LC | R  | C  | L | 1 | 1 |
| 29                     | Oriental Honey-buzzard     | <i>Pernis ptilorhynchus</i>     | LC | R  | C  | M | 1 | 1 |
| 30                     | Shikra                     | <i>Accipiter badius</i>         | LC | R  | C  | M | 1 | 1 |
| 31                     | Booted Eagle               | <i>Hieraaetus pennatus</i>      | LC | WM | C  | M | 1 | 1 |
| Order-Gruiformes       |                            |                                 |    |    |    |   |   |   |
| Family-Rallidae        |                            |                                 |    |    |    |   |   |   |
| 32                     | Slaty-breasted Rail        | <i>Lewinia striata</i>          | LC | R  | O  | S | 1 | 0 |
| 33                     | Ruddy-breasted Crake       | <i>Zapornia fusca</i>           | LC | R  | O  | S | 1 | 1 |
| 34                     | White-breasted Waterhen    | <i>Amaurornis phoenicurus</i>   | LC | R  | O  | M | 1 | 1 |
| 35                     | Common Moorhen             | <i>Gallinula chloropus</i>      | LC | R  | O  | M | 1 | 1 |
| 36                     | Eurasian Coot              | <i>Fulica atra</i>              | LC | WM | O  | M | 1 | 1 |
| Family-Jacaniidae      |                            |                                 |    |    |    |   |   |   |
| 37                     | Pheasant-tailed Jacana     | <i>Hydrophasianus chirurgus</i> | LC | R  | IV | M | 1 | 1 |
| 38                     | Bronze-winged Jacana       | <i>Metopidius indicus</i>       | LC | R  | O  | M | 1 | 1 |
| Order-Charadriiformes  |                            |                                 |    |    |    |   |   |   |
| Family-Charadriidae    |                            |                                 |    |    |    |   |   |   |
| 39                     | Grey headed Lapwing        | <i>Vanellus cinereus</i>        | LC | WM | IV | M | 0 | 1 |
| 40                     | Red-wattled Lapwing        | <i>Vanellus indicus</i>         | LC | R  | IV | M | 1 | 1 |
| Family-Rostratulidae   |                            |                                 |    |    |    |   |   |   |
| 41                     | Greater painted-snipe      | <i>Rostratula benghalensis</i>  | LC | R  | O  | S | 0 | 1 |
| Family-Scolopaciidae   |                            |                                 |    |    |    |   |   |   |
| 42                     | Common Snipe               | <i>Gallinago gallinago</i>      | LC | WM | O  | S | 1 | 1 |
| 43                     | Green Sandpiper            | <i>Tringa ochropus</i>          | LC | WM | C  | S | 1 | 1 |
| 44                     | Wood Sandpiper             | <i>Tringa glareola</i>          | LC | WM | C  | S | 0 | 1 |
| 45                     | Common Sandpiper           | <i>Actitis hypoleucos</i>       | LC | WM | C  | S | 1 | 1 |
| Family-Glareolidae     |                            |                                 |    |    |    |   |   |   |
| 46                     | Oriental pratincole        | <i>Glareola maldivarum</i>      | LC | r  | C  | S | 0 | 1 |
| Family-Laridae         |                            |                                 |    |    |    |   |   |   |
| 47                     | Common Tern                | <i>Sterna hirundo</i>           | LC | PM | C  | M | 1 | 0 |
| Order-Columbiformes    |                            |                                 |    |    |    |   |   |   |
| Family-Columbidae      |                            |                                 |    |    |    |   |   |   |
| 48                     | Common Pigeon              | <i>Columba livia</i>            | LC | R  | G  | M | 1 | 1 |
| 49                     | Eurasian Collared Dove     | <i>Streptopelia decaocto</i>    | LC | R  | G  | M | 1 | 1 |
| 50                     | Spotted Dove               | <i>Spilopelia chinensis</i>     | LC | R  | G  | M | 1 | 1 |
| 51                     | Yellow-footed Green Pigeon | <i>Treron phoenicopterus</i>    | LC | R  | F  | M | 1 | 1 |

| Order-Psittaciformes   |                           |                                    |    |    |   |   |   |   |
|------------------------|---------------------------|------------------------------------|----|----|---|---|---|---|
| Family-Psittaciformes  |                           |                                    |    |    |   |   |   |   |
| 52                     | Alexandrine Parakeet      | <i>Palaeornis eupatria</i>         | NT | R  | H | M | 1 | 1 |
| 53                     | Rose-ringed Parakeet      | <i>Alexandrinus krameri</i>        | LC | R  | H | M | 1 | 1 |
| 54                     | Plum-headed Parakeet      | <i>Himalayapsitta cyanocephala</i> | LC | R  | H | M | 1 | 1 |
| 55                     | Red-breasted Parakeet     | <i>Psittacula alexandri</i>        | NT | R  | H | M | 0 | 1 |
| Order-Cuculiformes     |                           |                                    |    |    |   |   |   |   |
| Family-Cuculidae       |                           |                                    |    |    |   |   |   |   |
| 56                     | Jacobin Cuckoo            | <i>Clamator jacobinus</i>          | LC | SM | I | M | 1 | 1 |
| 57                     | Common Hawk Cuckoo        | <i>Hierococcyx varius</i>          | LC | R  | I | M | 1 | 1 |
| 58                     | Indian Cuckoo             | <i>Cuculus micropterus</i>         | LC | PM | I | M | 0 | 1 |
| 59                     | Common Cuckoo             | <i>Cuculus canorus</i>             | LC | PM | I |   | 0 | 1 |
| 60                     | Lesser Cuckoo             | <i>Cuculus poliocephalus</i>       | LC | PM | I | S | 0 | 1 |
| 61                     | Plaintive Cuckoo          | <i>Cacomantis merulinus</i>        | LC | LM | I | S | 1 | 1 |
| 62                     | Asian Koel                | <i>Eudynamys scolopaceus</i>       | LC | R  | F | M | 1 | 1 |
| 63                     | Greater Coucal            | <i>Centropus sinensis</i>          | LC | R  | C | M | 1 | 1 |
| 64                     | Lesser Coucal             | <i>Centropus bengalensis</i>       | LC | R  | C | M | 1 | 0 |
| Order- Strigiformes    |                           |                                    |    |    |   |   |   |   |
| Family-Tytonidae       |                           |                                    |    |    |   |   |   |   |
| 65                     | Barn Owl                  | <i>Tyto alba</i>                   | LC | R  | C | M | 1 | 1 |
| Family-Strigidae       |                           |                                    |    |    |   |   |   |   |
| 66                     | Spotted Owlet             | <i>Athene brama</i>                | LC | R  | C | S | 1 | 1 |
| Order-Caprimulgiformes |                           |                                    |    |    |   |   |   |   |
| Family- Caprimulgidae  |                           |                                    |    |    |   |   |   |   |
| 67                     | Large-tailed Nightjar     | <i>Caprimulgus macrurus</i>        | LC | R  | I | M | 1 | 1 |
| Order-Apodiformes      |                           |                                    |    |    |   |   |   |   |
| Family-Apodidae        |                           |                                    |    |    |   |   |   |   |
| 68                     | Asian Palm Swift          | <i>Cypsiurus balasiensis</i>       | LC | R  | I | S | 1 | 1 |
| 69                     | Little Swift              | <i>Apus affinis</i>                | LC | R  | I | S | 1 | 0 |
| Order-Bucerotiformes   |                           |                                    |    |    |   |   |   |   |
| Family-Upupidae        |                           |                                    |    |    |   |   |   |   |
| 70                     | Common Hoopoe             | <i>Upupa epops</i>                 | LC | R  | I | M | 1 | 1 |
| Order-Coraciiformes    |                           |                                    |    |    |   |   |   |   |
| Family-Coraciidae      |                           |                                    |    |    |   |   |   |   |
| 71                     | Indian Roller             | <i>Coracias benghalensis</i>       | LC | R  | C | M | 1 | 1 |
| Family-Alcedinidae     |                           |                                    |    |    |   |   |   |   |
| 72                     | Stork-billed Kingfisher   | <i>Pelargopsis capensis</i>        | LC | R  | C | M | 1 | 1 |
| 73                     | White-throated Kingfisher | <i>Halcyon smyrnensis</i>          | LC | R  | C | M | 1 | 1 |
| 74                     | Common Kingfisher         | <i>Alcedo atthis</i>               | LC | R  | C | S | 1 | 1 |
| 75                     | Pied Kingfisher           | <i>Ceryle rudis</i>                | LC | R  | C | S | 0 | 1 |
| Family-Meropidae       |                           |                                    |    |    |   |   |   |   |
| 76                     | Green Bee-eater           | <i>Merops orientalis</i>           | LC | R  | I | S | 1 | 1 |



|                             |                             |                                 |    |    |   |   |   |   |
|-----------------------------|-----------------------------|---------------------------------|----|----|---|---|---|---|
| 77                          | Blue-tailed Bee-eater       | <i>Merops philippinus</i>       | LC | R  | I | S | 1 | 1 |
| <b>Order-Piciformes</b>     |                             |                                 |    |    |   |   |   |   |
| <b>Family-Megalaimidae</b>  |                             |                                 |    |    |   |   |   |   |
| 78                          | Lineated Barbet             | <i>Psilopogon lineatus</i>      | LC | R  | O | M | 1 | 1 |
| 79                          | Blue-throated Barbet        | <i>Psilopogon asiaticus</i>     | LC | R  | O | S | 1 | 1 |
| 80                          | Coppersmith Barbet          | <i>Psilopogon haemacephalus</i> | LC | R  | O | S | 1 | 1 |
| <b>Family-Picidae</b>       |                             |                                 |    |    |   |   |   |   |
| 81                          | Eurasian Wryneck            | <i>Jynx torquilla</i>           | LC | WM | I | S | 0 | 1 |
| 82                          | Rufous Woodpecker           | <i>Micropternus brachyurus</i>  | LC | R  | I | S | 1 | 1 |
| 83                          | Fulvous-breasted Woodpecker | <i>Dendrocopos macei</i>        | LC | R  | I | S | 1 | 1 |
| 84                          | Streak-throated Woodpecker  | <i>Picus xanthopygaeus</i>      | LC | R  | I | M | 1 | 1 |
| 85                          | Black-rumped Flameback      | <i>Dinopium benghalense</i>     | LC | R  | I | M | 1 | 1 |
| <b>Order-Passeriformes</b>  |                             |                                 |    |    |   |   |   |   |
| <b>Family-Pittidae</b>      |                             |                                 |    |    |   |   |   |   |
| 86                          | Indian Pitta                | <i>Pitta brachyura</i>          | LC | R  | I | S | 0 | 1 |
| <b>Family-Artamidae</b>     |                             |                                 |    |    |   |   |   |   |
| 87                          | Ashy Woodswallow            | <i>Artamus fuscus</i>           | LC | R  | I | S | 1 | 1 |
| <b>Family-Campephagidae</b> |                             |                                 |    |    |   |   |   |   |
| 88                          | Black-headed Cuckooshrike   | <i>Lalage melanoptera</i>       | LC | R  | I | S | 1 | 0 |
| <b>Family-Aegithinidae</b>  |                             |                                 |    |    |   |   |   |   |
| 89                          | Common Iora                 | <i>Aegithina tiphia</i>         | LC | R  | I | S | 0 | 1 |
| <b>Family-Laniidae</b>      |                             |                                 |    |    |   |   |   |   |
| 90                          | Brown Shrike                | <i>Lanius cristatus</i>         | LC | WM | C | S | 1 | 1 |
| 91                          | Long-Tailed Shrike          | <i>Lanius schach</i>            | LC | R  | C | S | 1 | 1 |
| 92                          | Grey-backed shrike          | <i>Lanius tephronotus</i>       | LC | WM | C | S | 0 | 1 |
| <b>Family-Dicruridae</b>    |                             |                                 |    |    |   |   |   |   |
| 93                          | Lesser Racket-tailed Drongo | <i>Dicrurus remifer</i>         | LC | WM | C | S | 0 | 1 |
| 94                          | Hair-crested Drongo         | <i>Dicrurus hottentottus</i>    | LC | WM | C | M | 0 | 1 |
| 95                          | Black Drongo                | <i>Dicrurus macrocercus</i>     | LC | R  | C | M | 1 | 1 |
| 96                          | Ashy Drongo                 | <i>Dicrurus leucophaeus</i>     | LC | LM | C | M | 1 | 1 |
| 97                          | Bronzed Drongo              | <i>Dicrurus aeneus</i>          | LC | R  | C | S | 1 | 1 |
| <b>Family-Oriolidae</b>     |                             |                                 |    |    |   |   |   |   |
| 98                          | Indian Golden Oriole        | <i>Oriolus kundoo</i>           | LC | LM | O | M | 1 | 1 |
| 99                          | Black-naped Oriole          | <i>Oriolus chinensis</i>        | LC | LM | O | M | 1 | 1 |
| 100                         | Black-hooded Oriole         | <i>Oriolus xanthornus</i>       | LC | R  | O | M | 1 | 1 |
| <b>Family-Monarchidae</b>   |                             |                                 |    |    |   |   |   |   |
| 101                         | Indian Paradise-flycatcher  | <i>Terpsiphone paradisi</i>     | LC | R  | I | S | 1 | 1 |
| <b>Family-Corvidae</b>      |                             |                                 |    |    |   |   |   |   |
| 102                         | Rufous Treepie              | <i>Dendrocitta vagabunda</i>    | LC | R  | O | M | 1 | 1 |
| 103                         | Large-billed Crow           | <i>Corvus macrorhynchos</i>     | LC | R  | O | M | 1 | 1 |

|                              |                              |                                  |    |    |   |   |   |   |
|------------------------------|------------------------------|----------------------------------|----|----|---|---|---|---|
| 104                          | House Crow                   | <i>Corvus splendens</i>          | LC | R  | O | M | 1 | 1 |
| <b>Family-Paridae</b>        |                              |                                  |    |    |   |   |   |   |
| 105                          | Cinereous Tit                | <i>Parus cinereus</i>            | LC | R  | O | S | 1 | 0 |
| <b>Family-Hirundinidae</b>   |                              |                                  |    |    |   |   |   |   |
| 106                          | Streak-throated Swallow      | <i>Petrochelidon fluvicola</i>   | LC | WM | I | S | 1 | 1 |
| 107                          | Wire-tailed Swallow          | <i>Hirundo smithii</i>           | LC | WM | I | S | 1 | 1 |
| 108                          | Barn Swallow                 | <i>Hirundo rustica</i>           | LC | WM | I | S | 1 | 1 |
| 109                          | Red-rumped Swallow           | <i>Cecropis daurica</i>          | LC | R  | I | S | 1 | 1 |
| <b>Family-Alaudidae</b>      |                              |                                  |    |    |   |   |   |   |
| 110                          | Bengal Bushlark              | <i>Mirafra assamica</i>          | LC | R  | O | S | 1 | 0 |
| 111                          | Ashy-crowned Sparrow Lark    | <i>Eremopterix griseus</i>       | LC | LM | O | S | 1 | 0 |
| <b>Family-Pycnonotidae</b>   |                              |                                  |    |    |   |   |   |   |
| 112                          | Red-whiskered Bulbul         | <i>Pycnonotus jocosus</i>        | LC | R  | O | S | 1 | 1 |
| 113                          | Red-vented Bulbul            | <i>Pycnonotus cafer</i>          | LC | R  | O | S | 1 | 1 |
| <b>Family-Cisticolidae</b>   |                              |                                  |    |    |   |   |   |   |
| 114                          | Yellow-bellied Prinia        | <i>Prinia flaviventris</i>       | LC | R  | I | S | 1 | 1 |
| 115                          | Plain Prinia                 | <i>Prinia inornata</i>           | LC | R  | I | S | 1 | 1 |
| 116                          | Zitting Cisticola            | <i>Cisticola juncidis</i>        | LC | R  | I | S | 1 | 1 |
| 117                          | Common Tailorbird            | <i>Orthotomus sutorius</i>       | LC | R  | I | S | 1 | 1 |
| <b>Family-Locustellidae</b>  |                              |                                  |    |    |   |   |   |   |
| 118                          | Striated Grassbird           | <i>Megalurus palustris</i>       | LC | R  | I | M | 1 | 0 |
| 119                          | Pallas's grasshopper warbler | <i>Locustella certhiola</i>      | LC | WM | I | S | 0 | 1 |
| <b>Family-Acrocephalidae</b> |                              |                                  |    |    |   |   |   |   |
| 120                          | Thick-billed Warbler         | <i>Arundinax aedon</i>           | LC | WM | I | S | 1 | 1 |
| 121                          | Clamorous Reed-warbler       | <i>Acrocephalus stentoreus</i>   | LC | WM | I | S | 1 | 1 |
| 122                          | Black-browed Reed Warbler    | <i>Acrocephalus bistrigiceps</i> | LC | WM | I | S | 1 | 0 |
| 123                          | Paddyfield Warbler           | <i>Acrocephalus agricola</i>     | LC | WM | I | S | 1 | 1 |
| 124                          | Blyth's Reed Warbler         | <i>Acrocephalus dumetorum</i>    | LC | WM | I | S | 1 | 1 |
| 125                          | Booted Warbler               | <i>Iduna caligata</i>            | LC | WM | I | S | 1 | 1 |
| <b>Family-Phylloscopidae</b> |                              |                                  |    |    |   |   |   |   |
| 126                          | Common Chiffchaff            | <i>Phylloscopus collybita</i>    | LC | WM | I | S | 1 | 1 |
| 127                          | Yellow-browed Warbler        | <i>Phylloscopus inornatus</i>    | LC | WM | I | S | 1 | 1 |
| 128                          | Dusky Warbler                | <i>Phylloscopus fuscatus</i>     | LC | WM | I | S | 0 | 1 |
| 129                          | Tickell's Leaf Warbler       | <i>Phylloscopus affinis</i>      | LC | WM | I | S | 0 | 1 |
| 130                          | Hume's Leaf Warbler          | <i>Phylloscopus humei</i>        | LC | WM | I | S | 0 | 1 |
| 131                          | Greenish Warbler             | <i>Phylloscopus trochiloides</i> | LC | WM | I | S | 1 | 1 |
| 132                          | Green-crowned Warbler        | <i>Phylloscopus burkii</i>       | LC | WM | I | S | 0 | 1 |
| <b>Family-Leiotrichidae</b>  |                              |                                  |    |    |   |   |   |   |
| 133                          | Jungle Babbler               | <i>Turdoides striata</i>         | LC | R  | O | M | 1 | 1 |
| <b>Family-Zosteropidae</b>   |                              |                                  |    |    |   |   |   |   |



|                             |                               |                                 |    |    |   |   |   |   |
|-----------------------------|-------------------------------|---------------------------------|----|----|---|---|---|---|
| 134                         | Oriental White-eye            | <i>Zosterops palpebrosus</i>    | LC | R  | O | S | 0 | 1 |
| <b>Family-Sturnidae</b>     |                               |                                 |    |    |   |   |   |   |
| 135                         | Jungle Myna                   | <i>Acridotheres fuscus</i>      | LC | R  | O | S | 1 | 1 |
| 136                         | Common Myna                   | <i>Acridotheres tristis</i>     | LC | R  | O | S | 1 | 1 |
| 137                         | Asian Pied Starling           | <i>Gracupica contra</i>         | LC | R  | O | S | 1 | 1 |
| 138                         | Chestnut-tailed Starling      | <i>Sturnia malabarica</i>       | LC | R  | O | S | 1 | 1 |
| 139                         | Orange-headed Thrush          | <i>Geokichla citrina</i>        | LC | R  | I | S | 1 | 1 |
| 140                         | Scaly Thrush                  | <i>Zoothera dauma</i>           | LC | SM | I | S | 1 | 0 |
| 141                         | Tickell's Thrush              | <i>Turdus unicolor</i>          | LC | WM | I | S | 0 | 1 |
| <b>Family-Muscicapidae</b>  |                               |                                 |    |    |   |   |   |   |
| 142                         | Bluethroat                    | <i>Cyanecula svecica</i>        | LC | WM | I | S | 1 | 1 |
| 143                         | Siberian Rubythroat           | <i>Calliope calliope</i>        | LC | WM | I | S | 1 | 1 |
| 144                         | Oriental Magpie-robin         | <i>Copsychus saularis</i>       | LC | R  | I | S | 1 | 1 |
| 145                         | Black Redstart                | <i>Phoenicurus ochruros</i>     | LC | WM | O | S | 1 | 1 |
| 146                         | Common Stonechat              | <i>Saxicola torquatus</i>       | LC | R  | I | S | 1 | 1 |
| 147                         | Brown-breasted Flycatcher     | <i>Muscicapa muttui</i>         | LC | WM | I | S | 1 | 0 |
| 148                         | Taiga Flycatcher              | <i>Ficedula albicilla</i>       | LC | WM | I | S | 1 | 1 |
| 149                         | Verditer Flycatcher           | <i>Eumyias thalassinus</i>      | LC | WM | I | S | 1 | 1 |
| 150                         | Blue-throated blue Flycatcher | <i>Cyornis rubeculoides</i>     | LC | SM | I | S | 0 | 1 |
| <b>Family-Chloropseidae</b> |                               |                                 |    |    |   |   |   |   |
| 151                         | Jerdon's Leafbird             | <i>Chloropsis jerdoni</i>       | LC | R  | O | S | 0 | 1 |
| <b>Family-Dicaeidae</b>     |                               |                                 |    |    |   |   |   |   |
| 152                         | Pale-billed Flowerpecker      | <i>Dicaeum erythrorhynchos</i>  | LC | R  | O | S | 1 | 1 |
| <b>Family-Nectariniidae</b> |                               |                                 |    |    |   |   |   |   |
| 153                         | Purple-rumped Sunbird         | <i>Leptocoma zeylonica</i>      | LC | R  | O | S | 1 | 1 |
| 154                         | Purple Sunbird                | <i>Cinnyris asiaticus</i>       | LC | R  | N | S | 1 | 1 |
| 155                         | Little Spiderhunter           | <i>Arachnothera longirostra</i> | LC | WM | O | S | 0 | 1 |
| <b>Family-Passeridae</b>    |                               |                                 |    |    |   |   |   |   |
| 156                         | House Sparrow                 | <i>Passer domesticus</i>        | LC | R  | O | S | 1 | 1 |
| <b>Family-Ploceidae</b>     |                               |                                 |    |    |   |   |   |   |
| 157                         | Baya Weaver                   | <i>Ploceus philippinus</i>      | LC | R  | G | S | 1 | 1 |
| <b>Family-Estrildidae</b>   |                               |                                 |    |    |   |   |   |   |
| 158                         | Indian Silverbill             | <i>Euodice malabarica</i>       | LC | R  | G | S | 1 | 1 |
| 159                         | Red Avadavat                  | <i>Amandava amandava</i>        | LC | LM | G | S | 1 | 1 |
| 160                         | Scaly-breasted Munia          | <i>Lonchura punctulata</i>      | LC | R  | G | S | 1 | 1 |
| 161                         | Tricoloured Munia             | <i>Lonchura malacca</i>         | LC | R  | G | S | 1 | 1 |
| 162                         | Chestnut Munia                | <i>Lonchura atricapilla</i>     | LC | R  | G | S | 1 | 1 |
| <b>Family-Motacillidae</b>  |                               |                                 |    |    |   |   |   |   |
| 163                         | Western Yellow Wagtail        | <i>Motacilla flava</i>          | LC | WM | O | S | 1 | 1 |
| 164                         | Citrine Wagtail               | <i>Motacilla citreola</i>       | LC | WM | C | S | 1 | 1 |

|     |                      |                                  |    |    |   |   |   |   |
|-----|----------------------|----------------------------------|----|----|---|---|---|---|
| 165 | Forest Wagtail       | <i>Dendronanthus indicus</i>     | LC | LM | I | S | 1 | 1 |
| 166 | Grey Wagtail         | <i>Motacilla cinerea</i>         | LC | WM | I | S | 1 | 0 |
| 167 | White Wagtail        | <i>Motacilla alba</i>            | LC | WM | I | S | 1 | 1 |
| 168 | White-browed Wagtail | <i>Motacilla maderaspatensis</i> | LC | R  | I | S | 1 | 1 |
| 169 | Richard's Pipit      | <i>Anthus richardi</i>           | LC | WM | I | S | 1 | 0 |
| 170 | Paddyfield Pipit     | <i>Anthus rufulus</i>            | LC | R  | I | S | 1 | 1 |
| 171 | Olive-backed Pipit   | <i>Anthus hodgsoni</i>           | LC | LM | O | S | 1 | 1 |

[Note: IUCN Status: LC- least concern; NT- near-threatened (IUCN, 2011); PM- passage migrant; R- resident; SM- summer migrant; WV- winter migrant; LM- local migrant; V- vagrant; I- insectivores, IV- invertivore, G- granivores, N- nectarivores, F- frugivores, O- omnivores, C- carnivores; 1- Present; 0- Absent; Y1- Year 2019-20; Y2- Year 2020-21]

#### 4. CONCLUSION

From our study we have seen that the diversity and richness of birds in this park continuously increasing because the Rajarhat area outside the Ecopark continuously shrinking due to rapid urbanisation. This highlights the importance of urban parks as the conservation strategy for the birds. That is why we need to increase such type of urban parks within the city.

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#### Authors' contributions:

Lina Chatterjee<sup>1</sup> – Planning, execution, data collection, analysis and photography of study

Tarak Samanta<sup>2</sup> – Execution of field work, data collection and analysis of study

Arjan Basu Roy<sup>3\*</sup> - Planning and guidance of the study

Saswati Sinha<sup>4</sup> and Sumana Besra<sup>5</sup> - Data collection, documentation of study

#### Ethical approval

Avifaunal diversity in Ecopark, West Bengal, India was observed in the study. The Animal ethical guidelines are followed in the study for species observation & identification.

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#### Conflicts of interests

The authors declare that there are no conflicts of interests.

#### Data and materials availability

All data associated with this study are present in the paper.

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